



ENVIRONMENTAL COMPLIANCE COSTS AND MINING PROJECT DEVELOPMENT

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The challenge for developing countries is how to transfer environmental awareness into policies and programmes that facilitate economic development while protecting the environment. Promoting growth, alleviating poverty, and protecting environment are mutually supportive objectives in the long run. But because economic problems are so extreme in developing countries, real trade-offs often arise between protecting the environment and satisfying basic short-run needs. Countries should not forsake environmental protection for economic returns.

Economic incentives and educational campaigns are more efficient than regulations which are difficult to enforce given the financial and manpower constraints. Regional information flows and networks would also go a long way in improving environmental awareness and compliance within regions. Companies also need to reciprocate government policy by making out policy statements as to their commitment to environmental stewardship.

Environmental Bonds: The posting of environmental bonds, a method which is mandatory in some states in the US is another possible way to force companies to take care of the mining environment. Bonds are posted at the beginning of the project and are released partially as the project develops and the environmental cleanup is carried out up to the end of the mine life when an inspection of the site by officials certifies that complete rehabilitation has been done. The bond is released when officials are satisfied with the clean-up efforts.

Economic Incentives: Many critics of regulation argue that the fundamental problem is with regulation itself. The only appropriate solution is to move to alternate approaches, primarily those that are incentive-based. Such alternatives tend to be favoured by economists who stress the need to find market-oriented solutions rather than impose legalistic requirements. Two specific alternatives which have received the most attention in the environmental area are marketable permits and emission charges. Economists further argue that due to the financial and manpower constraints faced by developing countries in trying to implement environmental regulations, countries should use market mechanisms which are 'cheaper' to administer once in place.

A system of marketable permits provides a means to control and limit an activity, but without the need for government to dictate the manner of performance. For instance in the case of pollution control, permits could be issued which, collectively, would limit emissions of pollutants to desired levels. Permits would be saleable, thus allowing exact patterns of pollution reduction to be determined by open-market trading. Sources able to inexpensively reduce emission would sell their extra permit rights to other sources whose clean-up would be more costly than permits. However, even with this system, enforcement would still be a government responsibility and the problem of knowing how much pollution reduction is appropriate would still remain. On the other hand by leaving decisions to individual firms, efficiency is enhanced by getting rid of bureaucratic red-tape.

Taxes applied directly to dischargers of pollutants have long been advocated as an efficient approach to environmental control. This is the most direct method of internalising external costs, the price of the product would then embody the full costs of production. Higher taxes would raise the product price, reduce demand and with it further environmental degradation. Pollution abatement taxes are popular, the world over.

CONCLUSION

It is undoubtable that environmental regulations adversely affect project economics since compliance costs raise overall project costs and thus affect profitability. Environmental costs, especially baseline study costs, have a much greater impact on project economics since projects are much more sensitive to current costs than to future costs such as those for rehabilitation and revegetation. The latter costs are future expenses and thus when discounted to the present do not have a significant impact in decision making.

The fact is in the 1990s, the destiny of the environment and the mining industry are intertwined, failure to make real reforms in the past has caused overbearing regulations today. If carried out successfully, good environmental management will assist in reducing liabilities, reducing costs and increasing efficiency.

activists and participate in formulation of regulations. Industry has the experience, resources and the knowledge to preserve the environment and therefore should be active. The companies stand to gain the most with sound and reasonable environmental regulations and lose the most if they do not participate in the formulation of regulations since legislators can set unattainable standards of compliance. The fact of the matter is, mining companies should take the lead and develop environmental programs effective both in price and protection. Legislation will no doubt increase costs but how reasonable or bearable the costs are will depend on the participation of industry in formulation of such regulations. What companies should understand is that regulation mostly occurs due to non-marketability of environmental quality.

However, there are fundamental problems regarding the use of a regulatory approach in environmental management. Three basic issues have to be addressed; formulation of standards, enforcement and uniformity of such standards. Standards are extremely difficult to set since environmental contamination is site specific, what might be appropriate for one scenario may be inadequate for another. Enforcement of standards provides little incentive for voluntary compliance and also requires on-site inspection which is not easy to ensure from the Government's point of view. The sheer number and variety of environmental problems make monitoring virtually impossible. The other problem is that regulatory approaches work best when applied to larger sources because such sources can easily be identified, on the other hand small sources are not easily identified. Legislation is effective when applied to new projects since it can be incorporated into planning often at a much lower cost than to projects already underway. For legislation to be effective it has to be transparent, without ambiguities and should be supported by requisite support structures for its enforcement.

Environmental Audits: Environmental audits have become necessary as environmental laws and regulations have become more complex and the economic costs of non-compliance are greater. Audits involve the identification of potential environmental problems, potential liability and implementation of any remedial action by the company as part of the environmental pattern of successful business. As a form of self-assessment and self evaluation, audits protect companies against any future litigation by injured parties. Although the cost of environmental audits comes out of corporate profits, in the long run companies do benefit. Audits represent a positive reaction to forced environmental compliance. All that companies need is a policy which commits it to prudent environmental management.

Environmental Rehabilitation Fund: Through legislation mining companies could be compelled to contribute to some rehabilitation fund during the life of the property. The contribution to the fund should be set as a proportion of annual revenues. Alternatively, in countries where royalties are collected from minerals, a proportion of these should be set aside into some fund for rehabilitation of mine sites. To make contribution to the fund attractive, the fiscal environment should give tax concessions to contributing companies by making such contributions tax deductible. The problem with this approach is determination of the level of contribution for each mine since impacts vary with mine size, mining method, mine life, nature of ore-body, etc. Another possible problem is administration of the fund, do countries have the institutional ability to oversee the success of the fund.

Bulkheads and concrete caps should be placed on all openings as part of the rehabilitation process. In most countries mine dumps should be well protected and revegetated.

ENVIRONMENTAL REGULATIONS AND PROJECT DEVELOPMENT

Environmental regulations have got adverse effects on both project economics through delays and overall utilisation of resources.

Project Economics: The resentment to environmental regulations by company executives is due to the effect which these regulations have on project economics. EIAs may harm project economics by raising operating costs and thus reducing profitability. The time delays associated with EIA may also harm project economics due to the time value of money. This is further exacerbated by the seasonality of mineral prices and changes in the cost structure as delays occur. What must be borne in mind is the fact that costs are ever increasing and delays can cause serious problems especially where the project is financed from loans which have a fixed repayment period. The fact is, increasing environmental compliance costs will decrease returns available to the mining industry. Costs of environmental compliance cause further erosion of mining investment, possible loss of jobs and erosion of corporate profits.

Cut-off Grade Selection: Environmental regulations force mining companies to opt for high grading as such expenses raise operating costs, as cut-off grade selection/determination is an economic decision. Companies raise cut-off grades in order to earn high revenues presently such that the mine life is reduced and so the community is denied of any spin-off benefits from the project in the longrun. Because of high grading marginal deposits become uneconomic and are neglected. What happens in this case is that the size of economic deposits is reduced which is a waste of resources since it is much more costly to rework waste from other mining operations. Intergenerational equity is compromised as future generations are denied the opportunity to enjoy the benefits of resource endowment.

Sterilisation of Resources: Environmental legislation by restricting use of certain areas of the country for natural resource conservation purposes may actually sterilise resources. For instance, land reserved for non-mineral purposes might contain good deposits which are thus made inaccessible for the country's benefit. The question is whether setting aside of the land benefits the country more than exploiting the contained resource. In such instances an accurate cost benefit analysis (CBA) should be done before such reservations are imposed. However, the other problem would be the cost of CBA might be prohibitive. The fact is, in a non-competitive markets such reservations of potentially rich land restrict mineral supply and pushes up prices unnecessarily. Unfortunately, such reservations can result in permanent sterilisation of mineral resources and potential benefits.

DISCUSSION

Enforcement of environmental regulations can take the form direct regulation through legislation, self monitoring through environmental auditing, creation of rehabilitation funds, use of environmental bonds and economic incentives.

Legislation: Legislation is the most common form of environmental monitoring in both LDCs and DCS. However, for sound legislation mining companies should be environmental

ENVIRONMENTAL COMPLIANCE COSTS

Overview

Environmental costs of a mining project are extremely difficult to predict. Not only are regulations changing rapidly, but due to a lack of precedents the intent of the regulations and how they should be observed is unclear. It is also impossible to see the exact effects of a mining project due to the many variables involved. Prediction can be done easily but some of these predictions might be wrong.

Common environmental costs which can impact on projects include; baseline study costs, permits and licences, environmental monitoring costs, environmental policy statements and rehabilitation and restoration plans. In countries where the review procedure goes through public forums/hearings costs of convening such forums fall on mining companies themselves.

Baseline study costs: In most countries companies are required to carry out environmental impact assessments (EIA) before project commencement. EIAs are designed to assess the socio-economic and environmental impacts of the planned project on, among other things, the natural environment, flora, fauna and settlement patterns. Social indicators are used to determine the economic costs and benefits parallel with engineering and economic feasibility. Regulations would normally require that initial conditions of the mining and milling site be assessed before development occurs. For non-fuel minerals baseline studies are normally required after initial exploration but this varies according to local requirements.

Baseline studies, in addition to being a cost themselves, have other associated costs as related to delays in project development. Baseline studies take long to commission, undertake and satisfactorily complete. Here we are dealing with delays in project commencement which might not be in the best interests of the project. For mining projects with volatile and unpredictable product prices such delays can make the difference between a viable and non-viable project. Baseline study costs are in current dollars as they are today's expenditures and therefore are much more crucial for any investment decision. In addition, because of the sensitivity of projects to initial capital costs, baseline study costs can make marginal deposits uneconomic and thus deny the economy both primary and secondary benefits from mineral exploitation. Baseline studies can cause unprecedented delays depending on the requirements of legislation. In general, North American base-line studies have on average lasted a minimum of twelve months for base metals.

Public Forum or Consultations: The normal procedure of EIAs is that they have to go through a review process at which the affected public is invited to air their views regarding the proposed project. This is a costly exercise and can cause unexpected delays in project commencement which when combined with escalating project costs could make the project uneconomic.

Rehabilitation: After working the mine regulations require that rehabilitation work be done to at least restore the environment to its original state. Four main parts of the mine need to be rehabilitated; all openings to the surface must be capped and fenced, surface structures and machinery must be removed and the area revegetated, toxic substances such as tailings and other mine wastes must be controlled and areas of collapse should be reinforced.

INTRODUCTION

The 1990s have witnessed a rise in environmental concerns by mining companies, governments, NGOs and other international agencies. The United Nations (UN), the World Bank (WB) and the International Monetary Fund (IMF), General Agreement on Tariffs and Trade (GATT) are in the forefront about greening. The UN has spearheaded efforts to place environmental problems on the world agenda. The report, *Our Common Future*, of the World Commission on Environmental Development, raised a call for decisive political action to link economic growth and development with sound management of our environment and set an agenda which has increasingly gathered momentum. Greening and sustainable development have become topical issues in recent years. The emergence of sustainable development as a guiding philosophy was born out of the widely held concern that current production and consumption practices are unsustainable and that we will ultimately threaten the very life support systems upon which we depend for survival. In today's language good environmental performance equates with big business performance.

The use of resources today without compromising benefits to future generations and sound environmental management have become crucial issues today. The current line of thought is pursuance of intergenerational equity through sustainable use of natural resources. The maintenance of genetic pools and biodiversity and of a constant capital stock are tenets of good environmental stewardship and have become of great concern the world over. The environment conference in Rio de Janeiro, Brazil in 1992 highlighted the issue of environmental degradation and global warming. World leaders at this conference confirmed their commitment to good environmental stewardship.

For the minerals industry, the Berlin Conference in 1991 set out rules of conduct of sustainable mining activities by mining companies. Mining is a wasting asset, its effects on the environment are crucial. The fact is, mining involves irreversible changes to the environment, thus sustainable use of these resources becomes paramount. The effects of mining on the environment vary according to the product, but generally the most common disturbances are; land degradation, air and water pollution, destruction of vegetation and natural habitats, and human health problems. The main sources of environmental pollution are base metals mines, smelters and alluvial gold panning.

The industry is now confronted by increasingly stringent environmental regulations that have significantly altered project economics especially for those projects already underway. For new projects, compliance costs have to be factored into feasibility studies and general economic planning. The fact is, an added cost to project development is introduced by environmental clean-up laws. This has met with severe resentment from corporate executives who view this as an erosion of their profits. Executives argue that, regardless of their merit, environmental issues present a serious threat to the continued viability of mining companies since environmental protection is not a free good. Costs of implementing environmental legislation come out of corporate profits in the short run but in the long run companies may change their strategies to protect their financial returns.

SUMMARY

In recent years developing countries, with pressure from international agencies and environmental action groups, have joined the rest of the world in insisting on sound environmental protection by all companies and individuals. Legislation on greening has come up in developing countries in the last few years in response to lack of action on environmental management by mining companies for years. Governments have come up with regulations to force these companies to do something about the environment while not creating hostile environments for investment. Environmental Impact Assessments (EIA) have become a requirements for all new projects in DCs and in some LDCs. While there is a general movement from enforcement of regulations to economic incentives, developing countries still pursue the former option for obvious reasons.

However, in formulating environmental regulations, the adverse effects of mining should be juxtaposed with the role which mining plays in advancing the economic and social progress of developing nations. Mining should be considered with associated costs and benefits. The linkage between development, mining and the environment should be examined in the light of the sector's contribution to growth and development. Adopting a military approach in as far as setting environmental regulations is concerned could backfire on countries. Sustainability as it pertains to mining requires recognition of the fact that the mining sector is of crucial importance to developing countries. Mining contributes significantly to GDP, employment, and export earnings in most LDCs. For example, in the Southern African Development Community (SADC), mining alone contributes an average of 10% to GDP per country. For such a group of countries suffering from economic constraints, measures to manage the environmental and socio-cultural impacts of mining are considered a luxury more amenable for the developed world. This however, does not imply that the sector should be left to ravage the ecosystem with impunity. It is thus imperative to first assess the entire ecosystem and general developmental context which may be affected by on-going or planned mining operations and then come up with appropriate regulations which take cognisance of mining's general economic impacts.

Effective enforcement of environmental regulations is made more difficult by institutional and technical complexities facing developing nations, consequently the use of a regulatory approach in terms of economic efficiency are immense. The inherent inflexibility in a legalistic regulatory scheme reduces opportunities to seek least cost solutions to environmental control, and can also freeze technological development

Most of the world's environmental policies are framed around direct regulation that relies on quantitative and qualitative emission and effluent standards. Economists argue that market related methods are more appropriate. These methods involve creation of a market for environmental use and include; taxation of emissions (carbon tax), tradeable permits, effluent charges and subsidies on emission reduction. Such an approach is based on the idea of optimal externalities in the sense that the sum total of the benefits of an economic activity less the total costs are maximised. Economic incentives as an alternative to the regulatory approach is much more effective in financially disadvantaged countries like the developing world.

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TABLE OF CONTENTS

SUMMARY	1
INTRODUCTION	2
ENVIRONMENTAL COMPLIANCE COSTS	2
Overview	2
Baseline study costs	3
Public Forum or Consultations	3
Rehabilitation	3
ENVIRONMENTAL REGULATIONS AND PROJECT DEVELOPMENT	3
Project Economics	4
Cut-off Grade Selection	4
Sterilisation of Resources	4
DISCUSSION	4
Legislation	4
Environmental Audits	5
Environmental Rehabilitation Fund	5
Environmental Bonds	5
Economic Incentives	6
CONCLUSION	6



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